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ABSTRACT

The teacher education unit at Chestnut Hill College (Pennsylvania) worked to incorporate National Council for the Accreditation of Teacher Education (NCATE) standards for technology education into its courses. Chestnut Hill intended to educate current students in technology use and planned to establish communication between the applied technology and education faculties and to bring applied technology faculty into the education department. Strategies have included placing two students who were both candidates for master's degrees in applied technology and certification in elementary education as student teachers in classrooms where teachers had integrated technology into their existing curricula. In addition, a member of the applied technology faculty has assisted students who chose to demonstrate software to their education classes at the college. Also, a member of the applied technology faculty and a member of the mathematics faculty collaborated to create a software folder for the Mathematics Teachers course. Students in that course were then required to work with that software and evaluate each piece. In addition, a member of the applied technology faculty taught the equivalent of one course as a guest lecturer in various undergraduate and graduate education courses to inform students of software and technology types and to model incorporating technology into education courses. The paper concludes by describing seven projects planned for the future. (JB)

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NCATE standards for educational technology: One college meets the challenge

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NCATE standards for educational technology:
One college meets the challenge

Objectives:

To trace the evolution of content and instruction about educational technology in teacher education programs;
To describe the teacher certification standards for technology use;
To present one college's model for preparing faculty to meet standards

The content of technology courses in teacher education programs has changed and evolved over the years since personal computers were first introduced into classrooms. We have moved from an emphasis on programming and computer technology as a separate subject to an emphasis on using computers to enhance and perhaps reshape the existing curriculum. Training teachers to provide instruction in computer applications and programming is necessary, but no longer sufficient. NCATE with the assistance of the International Society for Technology in Education has written standards for educating all teachers to use technology in their instructional practices across the curriculum as well as for their professional needs. These new standards invite us to rethink the teacher education curriculum, just as technology invites the K-12 teacher to rethink her curriculum.

The certification requirements prescribed by NCATE for all teachers and the incorporation of these requirements into existing certification programs pose new challenges for higher education. Professors must understand the range of possibilities for technology in education, be proficient in the use of the technology, and integrate technology into their existing courses. We who prepare teachers must model the use of technology throughout the curriculum. This paper recounts the strategies used by one college to accomplish this.

Technology as a subject of study has evolved over the years. Where programming was once the main focus of technology courses, the content now deals with on-line resources and the use of technology within the existing curriculum. Every professional organization, beginning with the National Council of Teachers of Mathematics, has written its latest guidelines acknowledging the various roles of technology within its discipline, predominantly as tools for research, exploration and productivity.

NCATE has mandated that teacher education units prepare all teachers to use technology. In addition to certification guidelines for teachers of computer science,

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NCATE has written guidelines for all classroom teachers. The recommendation is that every teacher education unit that intends to maintain its accreditation from NCATE must meet thirteen standards for teacher preparation. These standards have been developed in cooperation with the International Society for Technology in Education and acknowledge the vital roles that technology can play, not only in mathematics and science education, but also in language arts and literature, history, geography, social studies, and the arts.

The NCATE Unit Guidelines Committee incorporated recommendations concerning institutional support for the use of technology in teacher preparation programs. The first set of recommendations address the content and structure of coursework for preservice teachers. In the area of content studies for initial teacher preparation, NCATE guidelines state that candidates must complete a sequence of courses and/or experiences to develop an understanding of the structure, skills, core concepts, ideas, values, facts, methods of inquiry and uses of technology for the subjects they plan to teach. In other words preservice teachers must be introduced to applications and content area software and understand the roles technology can play in the subjects and for the age groups they plan to teach. In the area of pedagogical studies for initial teacher preparation, candidates should complete a well planned sequence of courses and/or experiences in professional studies in which they acquire and learn to apply knowledge about the impact of technological and societal changes on schools. They should also complete a well planned sequence of courses and/or experiences in pedagogical studies that help develop understanding and use of educational technology, including the use of computer and other technologies in instruction, assessment, and professional productivity.

In order to create the well planned sequence of courses and/or experiences with and about technology, faculty must themselves have some understanding of the variety of roles technology can play in classrooms. NCATE speaks to this issue by recommending that higher education faculty become knowledgeable about current practice related to the use of computers and technology and integrate them in their teaching and scholarship.
NCATE also includes guidelines for the teacher education unit concerning institutional support for the maintenance and use of technology. The guidelines identify the following requirements:

• that faculty and candidates have training in and access to education-related electronic information, video resources, computer hardware, software, related technologies, and other similar sources;

• that media, software, and materials collections are identifiable, relevant, accessible, and systematically reviewed to make acquisition decisions;

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• that there are sufficient library and technical staff to support the library, instructional materials collection, and media/computer support services;

• that facilities and equipment are functional and well-maintained. They support computing, educational communications, and educational and instructional technology at least at the level of other units in the institution.

All of these guidelines are valuable, and they establish standards to which every teacher education unit must aspire. But achieving these standards is not a straightforward endeavor. Insufficient time, money, equipment and perhaps also insufficient determination on the part of higher education faculties have separated technology education in many institutions from the rest of the pedagogical curriculum.

Historically, many colleges of teacher education have resisted incorporating technology into their education certification programs. The reasons for this include, but are not limited to the following: 1) insufficient equipment and expertise; 2) an already overburdened curriculum; 3) lack of understanding of the transformational role technology can play in classrooms; 4) the rapid changes in the field; 5) excessive hype by technology writers and 6) the suspicion that technology is a passing fad rather than a subject worthy of study. In many institutions, separate programs have been created by interested faculty members to address issues of technology in education. Many of these programs attract inservice teachers with bachelor's degrees in education seeking to enhance their skills, change their classroom practices, and increase their earning potential. Some of them intend to move to positions as computer resource teachers within their schools while others choose to remain in their self-contained classrooms.

Ironically even those schools where technology in education programs flourish frequently do not incorporate technology into their education certification programs. The nature of the field -- the constant changes in technology and available software -- makes it difficult for members of the education faculty to keep current. Inadequate resources, both in the college of education and in practica sites, further hamper the process. The two faculties remain separate and work with different populations. When the certification program addresses the issue of preparation to use technology, it is generally as a stand-alone course, dealing with applications.

But teachers teach as they have been taught. Beginning teachers need to see instruction modeled in which technology is integrated throughout the curriculum. This still remains difficult to do. Both in the field, and at the college, opportunities to work in technology-rich environments are rare. Few cooperating classroom teachers can model the use of technology across the curriculum because they lack the equipment as well as the

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expertise. Within education faculties, professors modeling instructional strategies that make intelligent use of technology are equally rare, and their access to technology to demonstrate such strategies is similarly constrained.

This paper presents a case study of one teacher education unit's strategies for incorporating NCATE standards in its courses. These strategies have been developed for several purposes. The immediate intent is to provide needed education in technology usage for those students currently enrolled in teacher certification programs at Chestnut Hill College. But in the long term, we are trying to create a mechanism to establish communication between the applied technology and education faculties. The long-range goal is to bring applied technology faculty into the education department as the courses in the two departments become increasingly similar. Over the next five to ten years, we see our certification and our applied technology master's programs coming together, so that all our education courses will model the integration of technology across curricular areas.

Our strategies include the following:

1) The placement of applied technology master's candidates who also seek certification in education in cooperating schools rich in technology, to participate in projects involving the use of technology across the curriculum. These same candidates will conduct research to assess the value and impact of these technologically enriched curricula. In this way education professors will see how the use of technology can change the quality of life in classrooms.

2) Presentations by students of exemplary software to their education classes. These presentations require the support and collaboration of a member of the applied technology faculty.

3) One-on-one collaboration between a member of the applied technology faculty and individual education faculty to demonstrate software for use in their courses. The creation of folders on designated computers in the main computer center enables faculty members to provide students with access to software for review.

4) The loan of one member of the applied technology faculty to the education faculty to "guest lecture" in their classes, using the individual professors' syllabi as guides for the integration of technology into each of their content areas. The member of the applied technology faculty was hired as an adjunct, thereby keeping the cost down.

Results to date

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Because this project has barely begun, and because meaningful educational change takes time to develop, we must assess progress conservatively. For each of these strategies, we have met with some success but also experienced some difficulties. The remainder of this paper will discuss how these strategies worked, and describe plans for the rest of this year as well as the next academic year.

Student Teachers

Two candidates for master's degrees in applied technology also seek certification in elementary education and were placed as student teachers this fall. We had applied for technology grants from Apple in partnership with each of the cooperating schools and had hoped to use our student teachers in those projects. We were not awarded those grants, but nevertheless placed our student teachers in classrooms in which teachers integrated technology into their existing curricula and valued its uses. Our intent was to provide a technology-rich experience for the student teacher, a computer-literate student teacher for the cooperating teacher and finally to demonstrate to the supervisor the value of such a classroom.

This strategy was successful in one setting where the student teacher was strong and capable. Her experience was valuable in every way, for her, for the class and for the supervisor, who came to admire her creativity and imagination. We had every confidence that she would succeed in the situation, and indeed she did. The difficulties encountered by the other student teacher were related to her own personal problems rather than to issues involving technology use, and need not be discussed here. In both cases it was unfortunate that we did not receive funding for increased technology.

Student presentations

One member of the applied technology faculty has assisted students who choose to demonstrate software to their education classes at the college. These presentations have been well received by students and by faculty. However the education faculty do not specifically require such presentations on a regular basis, and so their occurrence is only occasional. However, each semester an increasing number of students choose to use presentation software or technology in their senior seminar presentations, exposing faculty to new possibilities.

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Software folders

Access to computer technology is limited at the College. Our teaching labs are heavily scheduled, especially in the late afternoons and evenings. Despite this, we would like to encourage education classes to review and assess software. One strategy to accomplish this is to identify a selection of software for a specific class and to create a folder containing that software on the hard drives of our larger computers in the main computer center. We have done this for the environmental studies, chemistry, biology and physics undergraduate classes. This semester a member of the applied technology faculty and a member of the math faculty collaborated to create a folder for the Mathematics for Teachers course. Students were required to work with all the software in the folder and create written evaluations of each piece.

This particular activity not only introduced education students to quality software, but also enabled them to work through some of their own difficulties and misconceptions about mathematics. In the spring semester the folder will include software about probability, geometry, statistics and graphing. We expect this strategy to continue to be valuable, and we plan to establish more course-specific software folders as we network our Macintosh computers.

Guest lecturing

During the fall semester, a member of the applied technology faculty was hired as an adjunct by the education faculty to teach the equivalent of one course (39 hours) as a guest lecturer in various undergraduate and graduate education courses. The aim of this strategy was not only to provide information to students about pieces of software and kinds of technology, but also to model for education faculty members ways in which technology might be sensibly and meaningfully incorporated into their courses.

Guest lecturing dates were negotiated based on the availability of the applied technology faculty member (me) and the convenience of the education faculty member. Topics and software selection were also negotiated to suit the population and the content of each course. Students were required to respond in writing to these classes, and to make connections between the technology presentation and the content of the course. Some examples of these structured responses are in the appendix of this paper.

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To date guest lecturing has taken place in ten classes, covering a wide variety of topics and serving both the undergraduate and graduate population. Members of the children's literature courses examined CD-ROM storybooks and discussed the qualitative differences between printed books, books on tape and books on CD-ROM. Members of undergraduate and graduate reading courses examined an example of early reading software, *Bailey's Book House* by Edmark and analyzed its instructional design, identifying the underlying theories of beginning reading which inform the software. Members of these classes also evaluated several writing/publishing packages designed specifically for use by young children.

Students in the curriculum theory course explored software and CD-ROM packages across curricular areas and considered how these pieces might be combined in thematic units. Similarly, student teachers looked at *The Chronicle* by Sunburst, a package which formats a timeline, and brainstormed ways in which they could use this package for their own unit planning as well as how students could use the package across the curriculum.

Software was selected with the following criteria in mind: 1) ease of use; 2) fit with the course curriculum; 3) variety of applicability and 4) sound instructional design. The students' levels of expertise with Macintosh technology ranged from novice to expert, so software had to be user-friendly and of course, bug-free. Language arts classes worked with reading and writing software, while the broader based curriculum course and student teaching course lent themselves to greater variation in software across age levels and content areas. We looked for software that had many features (Spanish language translations in the CD-ROM storybooks, writing software with powerful graphics capabilities) or could be used in many different contexts (the timeline software for instance). Most importantly, we sought software whose instructional design illustrated the pedagogy we value: language arts software that demonstrated coherent theories about how children learn to read and write; productivity software that could be used in thematic units.

It is clear that these guest lectures accomplished the first goal -- to provide instruction for the current undergraduate and graduate education majors. Informally, students expressed their gratitude as they left each class, remarking on the value of the session. Education students have also demonstrated increased interest in the course offerings of the applied technology department. In written comments, students were enthusiastic about the software they saw and imaginative about how they might use such materials. This project will continue into the spring, be repeated next year and be offered to

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adjunct faculty as well. For the short term needs of the education department, it has been an inexpensive way to provide exposure to technology for our preservice teachers.

Our second goal was to model for education faculty the integration of technology into their course syllabi. In the fall semester this was less successful. The majority of education faculty chose as dates for the guest lecturer those occasions on which they themselves had to be absent and therefore needed the class "covered". They appreciated the opportunity to educate their students but in most cases were not there themselves. As this pattern emerged during the semester, it became apparent that in the future arrangements would have to be made more carefully, so as to ensure the participation of the education faculty in these guest lectures.

We do not believe that education faculty were necessarily trying to avoid learning about technology themselves. On the contrary, many faculty members expressed regret that they had to miss the classes. A further indication of their interest in technology was their request for some sort of professional development time dedicated to learning to use the College's Internet connection. However this occurrence reminds us that teachers, even college professors, must attend to practical considerations first, such as providing coverage for their classes when they must be absent. That they saw this as a valuable and desirable activity for their students is clear. Eight dates have been planned so far for the remainder of the spring semester in courses ranging from early childhood special topics to secondary education instructional planning.

Future Plans

All of the activities described in the previous section will continue in the spring semester and into next year. However we have developed other projects on which applied technology and education faculty will collaborate, strengthening the communication and ties between the two departments. Our purposes remain the same -- to introduce undergraduate and graduate education students to the roles of technology in schools and to help education faculty modify their courses to include the integration of appropriate technology. These projects are described below.

1) An undergraduate Macintosh applications course will be offered every semester. This course will be aimed at education students and serve the same purposes as the existing beginning applications course on the IBM platform. Students will be encouraged to do projects in which they develop units using technology in education.

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2) Workshops will be conducted in education classes by applied technology master's candidates. These workshops, which fulfill a program requirement for the applied technology master's degree candidate, will be designed for the education classes in which they occur, sharing the structure and intent of the guest lecture by the applied technology faculty member. This cross-fertilization should be a valuable learning experience for everyone, and fill a need for the education department.

3) Guest lecturing was extended to the research methods course offered by the education department, to demonstrate software for coding ethnographic notes to the adjunct faculty member teaching the course as well as to the students. This software will be made available for their research projects.

4) Software review sessions have been offered to members of the education department and folders have been created for use with their classes, following the model of the Mathematics for Teachers folder. We have established a language arts folder, and a science/social studies folder, and have invited education faculty to assign software review as part of their coursework.

5) Members of the undergraduate and graduate writing courses will be given email accounts on our Internet node. They will use these accounts to communicate with k-8 at-risk students in a Philadelphia public school. We believe this project can be beneficial to everyone involved in it. Education students will have authentic experiences responding to children's writing in a supervised setting within their courses, early in their curriculum. The children will have a new audience for their writing, with whom to hone their communication skills. Finally the Education faculty at the College will be able to incorporate technology into the writing courses in a particularly robust way.

6) Education and applied technology faculty members are collaborating on the design of a master's degree program in applied technology with reading certification. This program will include coursework in technology as well as coursework to satisfy Pennsylvania state requirements for reading certification. We believe that technology can and should play a vital role in the teaching of reading and writing, and that teachers who understand this relationship will be particularly valuable to their schools and school districts. This program capitalizes on the strengths of both departments and formalizes a connection between them.

7) Plans have been proposed for a Macintosh teaching lab which can be made available to the education faculty as well as to the other departments in the College. Providing access to computers has been difficult and as faculty members include technology components in their courses, this difficulty will necessarily increase. It will also

be necessary to complete the networking of our existing Macintosh facilities and their connection to our Internet node, which is currently PC based.

All of these activities will require changes and adjustments in curricula, methods and materials. It is easy to criticize where change does not seem to be occurring swiftly enough. It is harder to see change as an evolutionary process, in which all participants are called upon to make adjustments and decisions concerning their educational practices. Given the impetus of the NCATE standards, we are confident that this process, once underway, will continue to evolve. The preparation of confident teachers who can use technology imaginatively and intelligently depends on it.

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